

## COMMITTEE AMENDMENT

June 18, 2003

Purpose: To authorize appropriations for nanoscience, nanoengineering, and nanotechnology research, and for other purposes.

**IN THE COMMITTEE ON COMMERCE, SCIENCE, AND  
TRANSPORTATION**—108TH Cong., 1ST Sess.

**S. 189**, 108TH Congress, 1ST Session

JUNE 19, 2003

INTENDED to be proposed by Mr. WYDEN (for himself, Mr. ALLEN, Mr. MCCAIN, and Mr. HOLLINGS)

Viz: Strike out all after the enacting clause and insert the following:

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the “21st Century  
3 Nanotechnology Research and Development Act”.

4 **SEC. 2. NATIONAL NANOTECHNOLOGY PROGRAM.**

5 (a) NATIONAL NANOTECHNOLOGY PROGRAM.—The  
6 President shall implement a National Nanotechnology  
7 Program. Through appropriate agencies, councils, and the  
8 National Nanotechnology Coordination Office established  
9 in subsection (d), the Program shall—

10 (1) Establish the goals, priorities, grand chal-  
11 lenges, and metrics for evaluation for Federal

1 nanotechnology research, development, and other ac-  
2 tivities;

3 (2) Invest in Federal research and development  
4 programs in nanotechnology and related sciences to  
5 achieve those goals; and

6 (3) Provide for interagency coordination of Fed-  
7 eral nanotechnology research, development, and  
8 other activities undertaken pursuant to the Pro-  
9 gram.

10 (b) GOALS.—The goals of the National  
11 Nanotechnology Program shall include:

12 (1) Developing a fundamental understanding of  
13 matter that enables control and manipulation at the  
14 nanoscale.

15 (2) Ensuring United States global leadership in  
16 the development and application of nanotechnology.

17 (3) Advancing the United States' productivity  
18 and industrial competitiveness through stable, con-  
19 sistent, and coordinated investments in long-term  
20 scientific and engineering research in  
21 nanotechnology.

22 (4) Developing a network of shared facilities  
23 and centers to foster partnerships among research-  
24 ers in nanotechnology.

1           (5) Accelerating the deployment and application  
2           in the private sector, including startup companies, of  
3           nanoscale-related research and development.

4           (6) Providing effective education and training  
5           for researchers and professionals skilled in the mul-  
6           tidisciplinary perspectives necessary for  
7           nanotechnology so that a true interdisciplinary re-  
8           search culture for nanoscale science, engineering,  
9           and technology can emerge.

10          (7) Ensuring that ethical, legal, environmental,  
11          and other appropriate societal concerns are consid-  
12          ered during the development of nanotechnology, in-  
13          cluding safer sustainable nanoscience products and  
14          processing.

15          (c) PROGRAM MANAGEMENT.—The National Science  
16          and Technology Council shall oversee the planning, man-  
17          agement, and coordination of the National  
18          Nanotechnology Program. The Council, itself or through  
19          an appropriate subgroup it designates or establishes,  
20          shall—

21                (1) establish a set of broad applications of  
22                nanotechnology research and development, or grand  
23                challenges, to be met by the results and activities of  
24                the Program, based on national needs;

1           (2) provide for interagency coordination of the  
2     Program, including with the activities of the Defense  
3     Nanotechnology Research and Development Pro-  
4     gram established under section 246 of the Bob  
5     Stump National Defense Authorization Act for Fis-  
6     cal Year 2003 (Public Law 107-314);

7           (3) develop, within 12 months after the date of  
8     enactment of this Act, and update every 4 years  
9     thereafter, a strategic plan to meet the goals and  
10    priorities established under subsection (b) and to  
11    guide the activities and anticipated outcomes of the  
12    participating agencies, including a description of  
13    how the Program will move results out of the labora-  
14    tory and into application for the benefit of society,  
15    support for long-term funding for multidisciplinary  
16    research and development in technology, and dedica-  
17    tion of funding for interagency nanotechnology  
18    projects;

19          (4) coordinate the budget requests of each of  
20    the agencies involved in the Program with the Office  
21    of Management and Budget to ensure that a bal-  
22    anced nanotechnology research portfolio is main-  
23    tained in order to ensure the appropriate level of re-  
24    search effort;

1           (5) exchange information with academic, indus-  
2           try, State and local government (including State and  
3           regional nanotechnology programs), and other ap-  
4           propriate groups conducting research on and using  
5           nanotechnology;

6           (6) develop a plan to utilize Federal programs,  
7           such as the Small Business Innovation Research  
8           Program and the Small Business Technology Trans-  
9           fer Research Program, in support of the goal stated  
10          in subsection (b)(5);

11          (7) identify research areas that are not being  
12          adequately addressed by the agencies' current re-  
13          search programs;

14          (8) encourage progress on Program goals  
15          through the utilization of existing manufacturing fa-  
16          cilities and industrial infrastructures such as, but  
17          not limited to, the employment of underutilized man-  
18          ufacturing facilities in areas of high employment as  
19          production engineering and research testbeds; and

20          (9) provide for, on a merit-reviewed, competitive  
21          basis, interdisciplinary nanotechnology research cen-  
22          ters, which to the greatest extent possible, shall be  
23          established in geographically diverse centers includ-  
24          ing at least one center in a State participating in the  
25          National Science Foundation's (NSF) Experimental

1       Program to Stimulate Competitive Research  
2       (EPSCoR), established under section 113 of the  
3       NSF Authorization Act of 1988 (42 U.S.C. 1862(g))  
4       and shall encourage the participation of minority  
5       serving institutions at these centers.

6       (d) PROGRAM COORDINATION.—The President shall  
7       establish a National Nanotechnology Coordination Office,  
8       with full-time staff, which shall—

9               (1) provide technical and administrative support  
10       to the Council and the Advisory Panel;

11              (2) serve as the point of contact on Federal  
12       nanotechnology activities for government organiza-  
13       tions, academia, industry, professional societies,  
14       State nanotechnology programs, interested citizen  
15       groups, and others to exchange technical and pro-  
16       grammatic information;

17              (3) conduct public outreach, including dissemi-  
18       nation of findings and recommendations of the Advi-  
19       sory Panel, as appropriate; and

20              (4) establish an office to promote access to and  
21       early application of the technologies, innovations,  
22       and expertise derived from Program activities to  
23       agency missions and systems across the Federal gov-  
24       ernment, and to United States industry, including  
25       startup companies.

1 (e) ANNUAL REPORT.—The Council shall prepare an  
2 annual report, to be submitted to the House of Represent-  
3 atives Committee on Science and the Senate Committee  
4 on Commerce, Science, and Transportation at the time of  
5 the President’s budget request to Congress, that in-  
6 cludes—

7 (1) the Program budget, for the current fiscal  
8 year, for each agency that participates in the Pro-  
9 gram, including a breakout of spending for the de-  
10 velopment and acquisition of research facilities and  
11 instrumentation, for each program component area,  
12 and for all activities pursuant to subsection (b)(7),  
13 which shall be submitted by December 31st of such  
14 year;

15 (2) the proposed Program budget for the next  
16 fiscal year, for each agency that participates in the  
17 Program, including a breakout of spending for the  
18 development and acquisition of research facilities  
19 and instrumentation, for each program component  
20 area, and for all activities pursuant to subsection  
21 (b)(7);

22 (3) an analysis of the progress made toward  
23 achieving the goals and priorities established for the  
24 Program;

1           (4) an analysis of the extent to which the Pro-  
2       gram has incorporated the recommendations of the  
3       Advisory Panel and the Center, established in sec-  
4       tion 7 of this Act; and

5           (5) an assessment of how Federal agencies are  
6       implementing the plan described in section (c)(7),  
7       and a description of the amount of Small Business  
8       Innovative Research and Small Business Technology  
9       Transfer Research funds supporting the plan.

10 **SEC. 3. ADVISORY PANEL.**

11       (a) IN GENERAL.—The President shall establish or  
12       designate a National Nanotechnology Advisory Panel.

13       (b) QUALIFICATIONS.—The Panel established or des-  
14       ignated by the President under subsection (a) shall consist  
15       primarily of individuals who are non-Federal members and  
16       shall include representatives of academia and industry.  
17       Members of such Panel shall be qualified to provide advice  
18       and information on nanotechnology research, development,  
19       demonstrations, education, technology transfer, commer-  
20       cial application, or societal and ethical concerns. In select-  
21       ing or designating an Advisory Panel, the President may  
22       also seek and give consideration to recommendations from  
23       the Congress, industry, the scientific community (includ-  
24       ing the National Academy of Sciences), scientific profes-  
25       sional societies, academia, the defense community, State



1 and local governments, regional nanotechnology programs,  
2 and other appropriate organizations.

3 (c) DUTIES.—The Panel shall advise the Presi-  
4 dent and the Council on matters relating to the Pro-  
5 gram, including assessing—

6 (1) trends and developments in nanotechnology  
7 science and engineering;

8 (2) progress made in implementing the Pro-  
9 gram;

10 (3) the need to revise the Program;

11 (4) the balance among the components of the  
12 Program, including funding levels for the program  
13 component areas;

14 (5) whether the Program component areas, pri-  
15 orities, and technical goals developed by the Council  
16 are helping to maintain United States leadership in  
17 nanotechnology;

18 (6) the management, coordination, implementa-  
19 tion, and activities of the Program; and

20 (7) whether societal, ethical, environmental, and  
21 workforce concerns are adequately addressed by the  
22 Program.

23 (d) REPORTS.—The Advisory Panel shall report, not  
24 less frequently than once every 2 fiscal years, to the Presi-  
25 dent, the Senate Committee on Commerce, Science, and

1 Technology, and the House of Representatives Committee  
2 on Science on its assessments under subsection (c) and  
3 its recommendations for ways to improve the Program.  
4 The first report under this subsection shall be submitted  
5 within 1 year after the date of enactment of this Act.

6 (e) TRAVEL EXPENSES OF NON-FEDERAL MEM-  
7 BERS.—Non-Federal members of the Panel, while attend-  
8 ing meetings of the Panel or while otherwise serving at  
9 the request of the head of the Panel away from their  
10 homes or regular places of business, may be allowed travel  
11 expenses, including per diem in lieu of subsistence, as au-  
12 thorized by section 5703 of title 5, United States Code,  
13 for individuals in the Government serving without pay.  
14 Nothing in this subsection shall be construed to prohibit  
15 members of the Panel who are officers or employees of  
16 the United States from being allowed travel expenses, in-  
17 cluding per diem in lieu of subsistence, in accordance with  
18 existing law.

19 **SEC. 4. TRIENNIAL EXTERNAL REVIEW OF**  
20 **NANOTECHNOLOGY RESEARCH AND DEVEL-**  
21 **OPMENT PROGRAM.**

22 (a) IN GENERAL.—The Director of the National  
23 Science Foundation shall enter into an arrangement with  
24 the National Research Council of the National Academy

1 of Sciences to conduct a triennial evaluation of the Na-  
2 tional Nanotechnology Program, including—

3 (1) a review of the technical success of the Pro-  
4 gram in achieving the stated goals under the metrics  
5 established by the Program and the Advisory Panel,  
6 and under other appropriate measurements;

7 (2) a review of the Program's management and  
8 coordination across agencies and disciplines;

9 (3) a review of the funding levels by each agen-  
10 cy for the Program's activities and their ability with  
11 such funding to achieve the Program's stated goals;

12 (4) recommendations for new or revised Pro-  
13 gram goals;

14 (5) recommendations for new research areas,  
15 partnerships, coordination and management mecha-  
16 nisms, or programs to be established to achieve the  
17 Program's stated goals;

18 (6) recommendations for investment levels by  
19 each participating agency in each Program funding  
20 area for the 5-year period following the delivery of  
21 the report;

22 (7) recommendations on policy, program, and  
23 budget changes with respect to nanotechnology re-  
24 search and development activities;

1           (8) recommendations for improved metrics to  
2       evaluate the success of the Program in accom-  
3       plishing its stated goals;

4           (9) a review of the performance of the National  
5       Nanotechnology Coordination Office and its efforts  
6       to promote access to and early application of the  
7       technologies, innovations, and expertise derived from  
8       program activities to agency missions and systems  
9       across the Federal government and to United States  
10      industry; and

11          (10) an analysis of the relative position of the  
12      United States compared to other nations with re-  
13      spect to nanotechnology research and development,  
14      including the identification of any critical research  
15      areas where the United States should be the world  
16      leader to best achieve the goals of the Program.

17      (b) EVALUATION TO BE TRANSMITTED TO CON-  
18      GRESS.—The Director of the National Science Foundation  
19      shall transmit the results of any evaluation for which it  
20      made arrangements under subsection (a) to the Advisory  
21      Panel, the Senate Committee on Commerce, Science, and  
22      Transportation and the House of Representatives Com-  
23      mittee on Science upon receipt. The first such evaluation  
24      shall be transmitted no later than June 10, 2005, with

1 subsequent evaluations transmitted to the Committees  
2 every 3 years thereafter.

3 **SEC. 5. AUTHORIZATION OF APPROPRIATIONS.**

4 (a) NATIONAL SCIENCE FOUNDATION.—

5 (1) IN GENERAL.—There are authorized to be  
6 appropriated to the Director of the National Science  
7 Foundation to carry out the Director's responsibil-  
8 ities under this Act—

9 (A) \$350,000,000 for fiscal year 2004;

10 (B) \$385,000,000 for fiscal year 2005;

11 (C) \$424,000,000 for fiscal year 2006;

12 (D) \$449,000,000 for fiscal year 2007; and

13 (E) \$476,000,000 for fiscal year 2008.

14 (2) SPECIFIC ALLOCATIONS.—

15 (A) INTERDISCIPLINARY  
16 NANOTECHNOLOGY RESEARCH CENTERS.—Of  
17 the amounts authorized by paragraph (1) for  
18 each fiscal year, \$50,000,000 for each fiscal  
19 year shall be available for grants of up to  
20 \$5,000,000 each for multidisciplinary  
21 nanotechnology research centers.

22 (B) AMERICAN NANOTECHNOLOGY PRE-  
23 PAREDNESS CENTER.—Of the amounts author-  
24 ized by paragraph (1) for each fiscal year,  
25 \$5,000,000 shall be used to establish and main-

1           tain       a       university-based       American  
2       Nanotechnology Preparedness Center.

3           (C) NATIONAL NANOTECHNOLOGY COORDI-  
4       NATION OFFICE.— Of the sums authorized by  
5       paragraph (1) for each fiscal year, \$5,000,000  
6       shall be used for the activities of the  
7       Nanotechnology Coordination Office.

8           (D) MANUFACTURING TECHNOLOGIES FOR  
9       NANOMATERIALS.—Of the sums authorized by  
10      paragraph (1) for each fiscal year, \$5,000,000  
11      shall be used for the activities of the Center for  
12      Nanomaterials Manufacturing.

13      (b) DEPARTMENT OF ENERGY.—

14           (1) IN GENERAL.—There are authorized to be  
15      appropriated to the Secretary of Energy to carry out  
16      the Secretary's responsibilities under this Act—

17                   (A) \$265,000,000 for fiscal year 2004;

18                   (B) \$292,000,000 for fiscal year 2005;

19                   (C) \$321,000,000 for fiscal year 2006;

20                   (D) \$340,000,000 for fiscal year 2007;

21           and

22                   (E) \$360,000,000 for fiscal year 2008.

23           (2) ALLOCATION.—Of the sums authorized by  
24      paragraph (1) for each fiscal year, \$25,000,000 shall  
25      be used on a merit-reviewed and competitive basis to

1 support consortia that integrate newly developed  
2 nanotechnology and microfluidic tools with systems  
3 biology, immunology, and molecular imaging, of  
4 which at least 1 such consortium shall be provided  
5 with at least \$10,000,000 for each fiscal year.

6 (c) NATIONAL AERONAUTICS AND SPACE ADMINIS-  
7 TRATION.—There are authorized to be appropriated to the  
8 Administrator of the National Aeronautics and Space Ad-  
9 ministration to carry out the Administrator’s responsibil-  
10 ities under this Act—

- 11 (1) \$31,000,000 for fiscal year 2004;
- 12 (2) \$34,100,000 for fiscal year 2005;
- 13 (3) \$37,500,000 for fiscal year 2006;
- 14 (4) \$40,000,000 for fiscal year 2007; and
- 15 (5) \$42,300,000 for fiscal year 2008.

16 (d) NATIONAL INSTITUTES OF HEALTH.—There are  
17 authorized to be appropriated to the Director of the Na-  
18 tional Institutes to carry out the Director’s responsibilities  
19 under this Act—

- 20 (1) \$70,000,000 for fiscal year 2004;
- 21 (2) \$77,000,000 for fiscal year 2005;
- 22 (3) \$85,000,000 for fiscal year 2006;
- 23 (4) \$90,000,000 for fiscal year 2007; and
- 24 (5) \$95,000,000 for fiscal year 2008.

1 (e) NATIONAL INSTITUTE OF STANDARDS AND  
2 TECHNOLOGY.—There are authorized to be appropriated  
3 to the Director of the National Institute of Standards and  
4 Technology to carry out the Director's responsibilities  
5 under this Act—

6 (1) \$62,000,000 for fiscal year 2004;

7 (2) \$68,200,000 for fiscal year 2005;

8 (3) \$75,000,000 for fiscal year 2006;

9 (4) \$80,000,000 for fiscal year 2007; and

10 (5) \$84,000,000 for fiscal year 2008.

11 (f) ENVIRONMENTAL PROTECTION AGENCY.—There  
12 are authorized to be appropriated to the Administrator of  
13 the Environmental Protection Agency to carry out the Ad-  
14 ministrator's responsibilities under this Act—

15 (1) \$5,000,000 for fiscal year 2004;

16 (2) \$5,500,000 for fiscal year 2005;

17 (3) \$6,050,000 for fiscal year 2006;

18 (4) \$6,413,000 for fiscal year 2007; and

19 (5) \$6,800,000 for fiscal year 2008.

20 (g) DEPARTMENT OF JUSTICE.—There are author-  
21 ized to be appropriated to the Director of the National  
22 Institute of Justice to carry out the Director's responsibil-  
23 ities under this Act—

24 (1) \$1,000,000 for fiscal year 2004;

25 (2) \$1,100,000 for fiscal year 2005;



1 (3) \$1,210,000 for fiscal year 2006;

2 (4) \$1,283,000 for fiscal year 2007; and

3 (5) \$1,360,000 for fiscal year 2008.

4 (h) DEPARTMENT OF HOMELAND SECURITY.—There  
5 are authorized to be appropriated to the Secretary of  
6 Homeland Security to carry out the Secretary's respon-  
7 sibilities under this Act—

8 (1) \$2,000,000 for fiscal year 2004;

9 (2) \$2,200,000 for fiscal year 2005;

10 (3) \$2,420,000 for fiscal year 2006;

11 (4) \$2,570,000 for fiscal year 2007; and

12 (5) \$2,720,000 for fiscal year 2008.

13 (i) DEPARTMENT OF AGRICULTURE.—There are au-  
14 thorized to be appropriated to the Secretary of Agriculture  
15 to carry out the Secretary's responsibilities under this  
16 Act—

17 (1) \$10,000,000 for fiscal year 2004;

18 (2) \$11,000,000 for fiscal year 2005;

19 (3) \$12,100,000 for fiscal year 2006;

20 (4) \$12,830,000 for fiscal year 2007; and

21 (5) \$13,600,000 for fiscal year 2008.

22 **SEC. 6. AMERICAN NANOTECHNOLOGY PREPAREDNESS**  
23 **CENTER.**

24 (a) IN GENERAL.—The Director of the National  
25 Science Foundation shall, on a merit-reviewed and com-

1 petitive basis, establish a new American Nanotechnology  
2 Preparedness Center to encourage, conduct, coordinate,  
3 commission, collect, and disseminate research on the edu-  
4 cational, legal, workforce, societal, and ethical issues re-  
5 lated to nanotechnology.

6 (b) STUDIES.—The Director of the National Science  
7 Foundation, through the Center, shall conduct, coordi-  
8 nate, commission, collect, and disseminate studies on the  
9 educational, legal, workforce, societal, and ethical implica-  
10 tions of nanotechnology. The studies shall identify antici-  
11 pated issues and problems, as well as provide rec-  
12 ommendations for preventing or addressing such issues  
13 and problems.

14 (c) WORKFORCE DATA.—The Director of the Na-  
15 tional Science Foundation shall collect data on the size  
16 of the anticipated nanotechnology workforce need by de-  
17 tailed occupation, industry, and firm characteristics, and  
18 assess the adequacy of the trained talent pool in the  
19 United States to fill such workforce needs.

20 (d) ANNUAL REPORT.—The Director of the National  
21 Science Foundation shall compile the studies required by  
22 paragraph (b) and, with the assistance of the Center, shall  
23 complete a report that includes a description of the Cen-  
24 ter's activities, which shall be submitted to the President,  
25 the Council, the Advisory Panel, the Senate Committee on

1 Commerce, Science, and Transportation, and the House  
2 of Representatives Committee on Science not later than  
3 18 months after the date of enactment of this Act.

4 **SEC. 7. COMMERCIALIZATION ISSUES RELATED TO**  
5 **NANOSCIENCE AND NANOTECHNOLOGY.**

6 (a) IN GENERAL.—The Director of the National In-  
7 stitute of Standards and Technology shall establish a cen-  
8 ter within NIST’s Manufacturing Engineering Laboratory  
9 for issues relating to the commercialization of nanoscience  
10 and nanotechnology research. The program shall—

11 (1) conduct basic research on issues related to  
12 the development and manufacture of nanotechnology  
13 including—

14 (A) metrology;

15 (B) reliability and quality assurance;

16 (C) processes control; and

17 (D) manufacturing best practices; and

18 (2) in consultation with the National Technical  
19 Information Service and the National  
20 Nanotechnology Coordination Office, act as a clear-  
21 inghouse for information related to commercializa-  
22 tion of nanoscience and nanotechnology research, in-  
23 cluding—

1 (A) information relating activities by re-  
2 gional, state, and local commercial  
3 nanotechnology initiatives;

4 (B) transition of research, technologies,  
5 and concepts from Federal nanotechnology re-  
6 search and development programs into commer-  
7 cial and military products;

8 (C) best practices by government, univer-  
9 sity and private sector laboratories transitioning  
10 technology to commercial use;

11 (D) examples of ways to overcome barriers  
12 and challenges to technology deployment; and

13 (E) use of existing manufacturing infra-  
14 structure and workforce.

15 (b) USE OF MANUFACTURING EXTENSION PARTNER-  
16 SHIP PROGRAM.—The Director of the National Institute  
17 of Standards and Technology shall utilize the manufac-  
18 turing extension partnership program to the extent pos-  
19 sible to reach small and medium sized manufacturing com-  
20 panies.

21 (c) MANUFACTURING TECHNOLOGIES FOR  
22 NANOMATERIALS.—The Director of the National Science  
23 Foundation shall establish, on a merit-reviewed, competi-  
24 tive basis, a new Center for Nanomaterials Manufacturing  
25 to encourage the development and transfer of technologies

1 for the manufacture of nanomaterials. The Center will en-  
2 courage, conduct, coordinate, commission, collect, and dis-  
3 seminate research on new manufacturing technologies for  
4 materials with unprecedented combinations of strength,  
5 toughness, lightness, flame resistance, and membrane sep-  
6 aration characteristics, and develop mechanisms to trans-  
7 fer such manufacturing technologies to United States in-  
8 dustries.

9 **SEC. 8. DEFINITIONS.**

10 In this Act:

11 (1) **ADVISORY PANEL.**—The term “Advisory  
12 Panel” means the President’s National  
13 Nanotechnology Panel established or designated  
14 under section 3.

15 (2) **FUNDAMENTAL RESEARCH.**—The term  
16 “fundamental research” means research that builds  
17 a fundamental understanding and leads to discov-  
18 eries of the phenomena, processes, and tools nec-  
19 essary to control and manipulate matter at the  
20 nanoscale.

21 (3) **NANOTECHNOLOGY.**—The term  
22 “nanotechnology” means the ability to work at the  
23 molecular level, atom-by-atom, to create large struc-  
24 tures with fundamentally new molecular organiza-  
25 tion.

1           (4) PROGRAM.—The term “Program” means  
2           the National Nanotechnology Program established  
3           under section 2.

4           (5) COUNCIL.—The term “Council” means the  
5           National Science and Technology Council or an ap-  
6           propriate subgroup designated by the Council under  
7           section 2(c).

8           (6) GRAND CHALLENGE.—The term “grand  
9           challenge” means a fundamental problem in science  
10          or engineering, with broad potential economic and  
11          scientific impact, the solution to which will require  
12          the application of nanotechnology research.

○